Farm household's entry and exit into and from non-farm enterprises in rural Ethiopia: Does clustering play a role?

Merima Ali
Wageningen University: Agricultural Economics and Rural Policy Group
Hollandseweg 1, 6706 KN Wageningen, the Netherlands
Email: merima.ali@wur.nl

Jack Peerlings
Wageningen University: Agricultural Economics and Rural Policy Group
Hollandseweg 1, 6706 KN Wageningen, the Netherlands
Email: jack.peerlings@wur.nl

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1. Introduction

Poverty and income variability remains one of the biggest challenges facing most rural households in Sub-Saharan Africa (SSA). Even though agriculture is the main source of income for more than 85% of the rural population in the region, the dwindling size of agricultural land due to increasing population, low productivity and hostile agro ecological factors often result in extreme income variability. One of the mechanisms used by rural households to smooth income variability is to diversify their activities by starting a non-farm enterprise. Evidence suggests that close to 42% of income for rural households in Africa is derived from non-farm activities despite the fact that only 10% of the rural labor force is employed in such activities (Haggblade et al., 2002). Non-farm enterprises are particularly important in generating income and employment for the poorest segment of the society, particularly women and unskilled labor (Nadvi and Barrientos, 2004). In addition to income-earning opportunities, the promotion and establishment of rural non-farm enterprises are also noted to play an important role in reducing food insecurity in rural Africa (Barrett et al., 2001).

Yet, rural households face various constraints when establishing and expanding non-farm enterprises such as lack of capital, limited market access and technical knowhow, poor information access, etc. Infrastructure and other complementary services like research and training centers, government and regulatory institutions and financial services are often absent in rural areas because of high cost due to lower population densities, having negative implications for economies of scale (Eifert and Ramachandran, 2004). This results in higher transaction costs both for establishing and expanding businesses in rural areas implying significant entry barriers and high exit rates of non-farm enterprises (Haggblade et al., 2007). The total closure rate among rural non-farm enterprises in Africa is quite high[1] where the likelihood of exiting is found to be common among newly established ones (Loening et al., 2008).

In recent literatures, industrial clusters are noted as one form of institution that can help to reduce the various transaction costs faced by enterprises both when establishing and during the operation of businesses (Sonobe and Otsuka, 2006; Ali and Peerlings, 2010). Clustering, through specialization and division of labor, can lower entry barriers by reducing the initial capital required to start a business, even in the absence of a well-functioning capital market (Huang et al., 2008; Ali et al., 2010). The barriers to start a business can also be lower in industrial clusters than in dispersed locations because needed assets, skills, inputs, local market and customers are readily available (Porter, 2000). Established relationships and social networks with various agents in the same community and the presence of "successful" local firms can also reduce the perceived risk of entry (Porter, 2000). Even after establishment, the presence of strong cluster environment that fosters growth and enhances regional comparative advantage plays an important role for the survival of enterprises (Schmitz and Nadvi, 1999; Ali and Peerlings, 2010).

In clusters there may also be forces that increase the entry cost and threaten the survival of the already established businesses by diminishing the returns to entrepreneurial activity (Delgado et al., 2010). This may occur from external diseconomies of scale such as air pollution, congestion, and fierce competition for limited markets and resources such as land and specialized inputs (Delgado et al., 2007; Sonobe and Otsuka, 2006).

The purpose of this study is to investigate how clustering affects the entry and exit decisions of farm households into and from non-farm enterprises in rural parts of Ethiopia. Several studies have examined the determinants of household's decisions to diversify to non-farm activities in developing countries (for example; Abdulai and Delgado, 1999; Barrett et al., 2001; Owusu et al., 2010). Most of these studies focus on the impact of household, farm and village characteristics, and some exogenous factors like rainfall and price variability in affecting the decision of households to diversify to non-farm activities. However, empirical work on the possible impact of clustering on entry costs for establishing non-farm enterprises and hence households' diversification decision is quite scarce (Huang et al., 2008). In addition, data on firm dynamics, particularly on micro enterprises is rarely available in SSA making studies on the determinants of exit decisions non-existent except for larger firms (Harding et al., 2004; Gebreeyesus, 2008). To the best of our knowledge, this is the first empirical work that looks at the entry and exit decisions of farm households into and from rural non-farm enterprises in Africa from a clustering point of view.

The study further investigates the impact of entry and exit into and from non-farm enterprises on household's well-being by using total household income, the food security status of a household and the household's ability to raise enough money in case of emergency, as indicators. Participation into a non-farm enterprise is hardly a random process where households with certain characteristics might self-select themselves both in the decision of entering into and exiting from non-farm enterprises. Failure to address the selection-bias may therefore result in wrong estimates of the impact of entry and exit into and from non-farm

[1] For example, the total closure rate of non-farm enterprises in Ethiopia is 25% (Loening et al., 2008)

enterprises on household's well-being. In order to address this issue, we use the non-parametric statistical method of propensity score matching where the well-being of households that have entered and exited non-farm enterprises is compared with counterfactual groups of households that have not entered and have not exited non-farm enterprises respectively. The data for this study is from the 2006/07 Rural Investment Climate Survey (RICS) collected by the World Bank together with the Central Statistical Authority of Ethiopia.

The remainder of the paper is organized as follows. Section 2 presents the theoretical framework for the entry and exit decisions of households into and from non-farm enterprises. Section 3 discusses the data and section 4 presents the empirical model. Section 5 presents the empirical results and section 6 provides a conclusion and discussion.

2. Theoretical framework: entry and exit decisions of households into and from non-farm enterprises

Let a farm household faces two choices; either to continue working in agriculture or to diversify its activity by starting a non-farm enterprise. Each household will make a choice based on a comparison of the expected post-entry non-farm enterprise profit to forgone agricultural income due to diversification. That is, a household will start a non-farm enterprise if its expected enterprise profit is higher than the forgone agricultural income from diversification. Otherwise, the household chooses to continue its agricultural work. Next we will formalize this idea.

Suppose a household has fixed endowments of labor and capital that it has to allocate among different activities. When household i is engaged only in agriculture, the present value of agricultural income is given as:

$$PV_i = E_t \sum_{\tau=t}^{T} \beta^{\tau-t} \pi_i\left(p_A, w_{A,} Z_i, \varphi_t, \varepsilon_t\right), \quad (1)$$

where E_t is the expectation operator given the information set at time t, β is the subjective discount factor, T is the number of periods and π_i is agricultural profit of household i. Agricultural profit is a function of prices of agricultural outputs (p_A) and inputs (w_A) and endowments of the fixed inputs; labor and capital (Z_i). φ_t is a vector of exogenous shocks that one way or the other can affect agricultural income like drought, flooding, price shocks etc. ε_t is household and farm specific unobservable characteristics that affect agricultural income.

In the case of diversifying its activity by starting a non-farm enterprise, the household will face entry barriers that can be affected by location specific factors like industrial clusters and the investment climate[2], the level of investment capital required to start the business and skill requirements.

Upon diversification, the household will have the following present values of income from the agricultural (A) and non-farm enterprise (B).

$$PV_{A,i} = E_t \sum_{\tau=t}^{T} \beta^{\tau-t} \pi_i\left(p_A, w_{A,} Z_{A,i}, \varphi_t, \varepsilon_t\right), \quad (2)$$

$$PV_{B,i} = -C_{t,i}(N_l, I_l, H_i) + E_t \sum_{\tau=t}^{T} \beta^{\tau-t} \pi_i\left(p_B(N_l, I_l), w_B(N_l, I_l), Z_{B,i}, \mu_t\right), \quad (3)$$

$$Z_i = Z_{A,i} + Z_{B,i} \quad (4)$$

Since the household is a price taker, the prices of agricultural outputs (p_A) and inputs (w_A) do not change whether the household works only in agriculture (equation 1) or diversifies with non-farm enterprise (equation 2). The household has to allocate the total amount of fixed inputs of labor and capital across the different activities as formulated in (4).

In equation 3, $C_{t,i}$ denotes the cost of entry in to a non-farm business. The entry cost can be affected by location specific characteristics like the investment climate (I_l) that can be captured by factors like availability of financial services, infrastructure, government regulations and taxes, safety of the locations, etc., which could increase or lower the entry barrier. These characteristics can capture the policies, institutional arrangements and infrastructure of a certain location and the effect they may have on transaction costs of entering a business. The cost of establishing a non-farm enterprise can also be affected by the existence of concentration of other enterprises (industrial clusters) in the same location(N_l). In addition to location specific

[2]Investment climate is defined as different characteristics specific to a certain location that could act as incentives or disincentives for running a business like availability of financial services, infrastructure, governance, regulations, taxes, conflict resolution, etc (Eifert and Ramachandran, 2004).

variables, the minimum required skills or entrepreneurial ability to run a non-farm enterprise can also be a barrier to enter a non-farm business. Although it is difficult to directly capture the inherent ability of individuals; the age, gender, and schooling of an entrepreneur, in this case a household head, can be used as an indicator and this is denoted by H_i.

Post entry non-farm enterprise profit in equation 3 is a function of output and input prices of the non-farm business denoted by p_B and w_B respectively. Input and output prices can further be affected by location specific factors that can have an impact on the transaction costs of procuring inputs and selling outputs like reduced transportation cost stemming from proximity of input suppliers and output buyers as in the case of industrial clusters. Other location specific variables like existence of big firms and other complimentary services may also facilitate the transaction of inputs and outputs (Krugman, 1991).

μ_t is enterprise specific and location specific unobservable characteristics that affect non-farm enterprise income.

The household will choose to diversify by starting a non-farm enterprise if and only if the total present value of income from diversification is greater than the present value of working only in agriculture.

$$PV_{A,i} + PV_{B,i} > PV_i \tag{5}$$

$$PV_{B,i} > PV_i - PV_{A,i} \tag{6}$$

Equation (6) states that a household will start a non-farm enterprise when the present value of income from a non-farm enterprise is greater than the present value of forgone agricultural income from diversification.

Following this, the probability ($prob$) that household i chooses to diversify its activity by starting a non-farm enterprise is given as:

$$prob_{Bi} = prob\left(-C_{t,i}(N_l, I_l, H_i) + E_t \sum_{\tau=t}^{T} \beta^{\tau-t} \pi_i\left(p_B(N_l, I_l), w_B(N_l, I_l), Z_{B,i}, \mu_t\right)\right) > prob\left(E_t \sum_{\tau=t}^{T} \beta^{\tau-t} \left(\pi_i\left(p_A, w_A, Z_i, \varphi_t, \varepsilon_t\right) - \pi_i\left(p_A, w_A, Z_{A,i}, \varphi_t, \varepsilon_t\right)\right)\right) \tag{7}$$

In the right hand side of equation (7), the price of agricultural outputs (p_A) and inputs (w_A) do not change whether the household works only in agriculture or diversifies its activity. As a result we would not expect them to play a role in affecting household's choice of activities except that they determine the actual level of profit. What differs in the choice of the two activities is the amount of fixed inputs of labor and capital, hence it is expected that household's labor and capital endowments do play a role in the decision to start a non-farm enterprise.

Let $d_{Bi} = 1$ if household i chooses to diversify its activity by starting a non-farm enterprise and 0 if it chooses to continue agricultural production. If we assume that the stochastic components μ_t and ε_t are independently and identically distributed, then the probability of entry into a non-farm enterprise is given by:

$$prob_{Bi} = \begin{cases} f(H_i, Z_i, N_l, I_l, \varphi_t) & if\ d_{Bi} = 1 \\ 0 & otherwise \end{cases} \tag{8}$$

After starting a non-farm enterprise, an incumbent household once again faces two choices; either to continue its diversified activity or to exit the non-farm business and go back to agricultural production. In the case of exiting the non-farm business, the household may face a barrier to exit such as investments made in non-transferable fixed assets, regulatory burdens and other closure costs that may arise from contract contingencies with suppliers or buyers. These costs may in turn be a function of location specific factors like the investment climate and existence of industrial clusters. For example, the cost of exit in industrial clusters may be lower due to a low level of investment in specialized activities and existence of "deeper markets for specialized assets" (Caves and Porter, 1977). Indicators of the investment climates like the regulatory burdens, the property rights and contract enforcement may also govern the transaction costs of liquidating a business. Furthermore, exit barriers can arise from household specific characteristics that can affect the bargaining power among household members in terms of deciding whether to terminate or continue the business. The bargaining power can be reflected by the social status of household members that can be captured by the age, gender and schooling of the main operator of the business.

The present value of income from the non-farm enterprise for an incumbent household will then depend on the trade-off between the costs that the household will incur upon exiting and the profit that it will earn it if continues operating the non-farm business. The profit that the enterprise will earn in turn depends on the price of outputs and inputs of the non-farm

business which are also a function of location specific factors. In addition to location specific factors, enterprise specific factors can also affect the profitability of the enterprise like the size of the enterprise, experience gained depending for how long the enterprise has stayed in the business, the type of operation, etc. Given these, the household will decide to exit the non-farm business if the present value of income from the non-farm enterprise is strictly less than the extra income that can be earned if the household had to engage only in the agricultural activity (equation 9).

$$PV_{B,i}^{E} < PV_{i}^{E} - PV_{A,i}^{E}, \quad (9)$$

where, PV^{E} is the present value of an incumbent household.

If we follow the same formulation as used for the entry decision, the probability of exiting a non-farm business will then become a function of household specific characteristics (H_i), enterprise specific factors (E_i), fixed inputs of capital and labor (Z_i), location specific factors (N_l, I_l), and exogenous shocks affecting agricultural output (φ_t).

3. Data

Data for this study is obtained from the Rural Investment Climate Survey (RICS) conducted by the World Bank together with the Central Statistical Authority of Ethiopia during December 2006 and January 2007. The survey has two parts where the first part contains more general questions on 14,000 households and 3,500 enterprises in four regions of Ethiopia, namely Amhara, Tigray, Oromia and SNNP. The second part of the survey contains a more detailed information only for the Amhara region. This part of the survey covers 2,900 households, 760 enterprises and 118 communities from 4 different zones of the Amhara region, covering almost one-half of Amhara's population of 18 million. The empirical analysis is based on the survey collected only for the Amhara region due to the availability of detailed information that are relevant for our analysis and because enterprise information can also be matched with household and community level characteristics. In the enterprise survey, information is collected on different forms of non-farm activities that include the manufacturing, trade and service sectors. Studies show that the benefits of clustering would best materialize in manufacturing sectors where a number of different specialized producers can operate along the same line of production (Porter, 2000; Nadvi and Barrientos, 2004; Sonobe and Otsuka, 2006). As a result, the analysis of this paper is mainly focused on non-farm enterprises that are operating in manufacturing activities like textiles, food and beverage, metal and wood work, leather and shoe production. In addition to the RICS, the 2002/03 Cottage/Handicraft Manufacturing Industry survey and the 2002/03 Large and Medium Scale Manufacturing Establishments Survey, both collected by the CSAE are used to calculate location specific variables.

4. Empirical Model and Variables

4.1 Determinants of entry and exit of households into and from non-far enterprises

Following the theoretical framework in section 2, we look at the impact of household and enterprise specific characteristic, location specific factors, household's endowment of capital and labor and exogenous shocks in determining the entry and exit decisions of households into and from non-farm enterprises. For this we formulate two probit models; one for the entry decision and another for the exit decision. The dependent variable for the entry decision is a dummy that takes a value of one if a household has started a non-farm enterprise in the past four years of the time of the survey and zero if the household has not started a non-farm enterprise at all. Similarly, a dummy variable is used as a dependent variable for the exit decision model that has a value of one if an enterprise has stopped the operation in the past four years of the time of the survey and zero if an enterprise is still operating at the time of the survey.

$$prob(entry) = \theta_1 H_i + \theta_2 Z_i + \theta_3 N_l + \theta_4 I_l + \theta_5 \varphi_t + \nu, \quad (10)$$

$$prob(exit) = \gamma_1 H_i + \gamma_2 Z_i + \gamma_3 E_i + \gamma_4 N_l + \gamma_5 I_l + \gamma_6 \varphi_t + \xi, \quad (11)$$

where the θ's and γ's are the corresponding parameters to be estimated for the entry and exit decision models respectively. ν and ξ are the error terms of the probit regressions of the entry and exit decision models respectively.

We use information on the entry and exit decisions of households only for the past four years in order to be able to match the information with enterprise and household specific explanatory variables that are available for the year of the survey, 2006/07. This is done under the assumption that most of the enterprise and household specific characteristics did not show a significant change in the past four years of the time of the survey.

As indicators of household characteristics (H_i) that can affect household's entry and exit decisions, we use gender, age, schooling and immigration status of the household head. Labor availability and capital endowment of a household (Z_i) are

indicated by household size and wealth of a household respectively. The wealth of a household is captured by a dummy that has a value of one if the roof of the household is made from iron sheet and zero otherwise. In addition to the wealth indicator, we use other income sources of a household that include agricultural income and non-agricultural income such as remittances, government transfers, wages and salaries from off-farm employment and pensions, insurance, etc.

Enterprise specific factors (E_i) used only in the exit decision model include the size of the enterprise, which is measured by the number of workers and experience as captured by the number of years since the establishment of the business. Whether the enterprise is a cottage industry or the operation is performed in a separate workspace outside of the entrepreneur's home is also used as additional enterprise specific factor that may affect the exit decision. Non-farm enterprises in SSA are often seasonal and are performed to compensate agricultural income. Hence, we use a dummy that has a value of one if the operation of the non-farm enterprise is seasonal and zero otherwise.

As a measure of clustering (N_l), we construct an index in order to measure the concentration of enterprises in a certain location. Different indices have been developed in the literature to measure the level of concentration of certain activities in a certain locations. The location quotient that quantifies how concentrated a certain sector is in a given location compared to a larger geographic unit, is one of the widely used measures of clustering (O'Donoghue and Gleave, 2004). The location quotient for a certain manufacturing sector is calculated for the most detailed spatial unit possible, the district, by using zone, which is the higher spatial unit next to a district, as a reference point.

$$LQ_{di} = (H_d/M_d)/(H_Z/M_Z), \qquad (12)$$

where LQ_{di} is the location quotient of a certain manufacturing sector i at district d; H_d is employment of sector i at district d; M_d is total manufacturing employment at district d; H_Z is employment of sector i at zone z and M_Z is total manufacturing employment at zone z. Here total manufacturing employment includes employment in micro, medium, and large-scale manufacturing sectors. The 2002/03[3] Cottage/Handicraft Manufacturing survey and the 2002/03 Large and Medium Scale Manufacturing Establishments Survey, both collected by CSAE are used for calculating the location quotient at district level.
In addition to the concentration of micro enterprises, we also calculate the concentration of large manufacturing firms at zonal level using the same technique, the location quotient. This is in order to see if the externalities that surrounding large firms may have an effect on household's entry and exit decisions into and from non-farm enterprises.

In order to capture the investment climate of a certain location (I_l), we use information from the 2006/07 RICS to capture road access and availability of credit services in nearby locations, various government related policies and regulations and the safety of the community. To capture the road access and credit services in nearby locations, we use the average distance in hours to reach the nearest all-weather road and a micro finance institution (MFIs) respectively. The average distance is measured for each enterprise. Travel time in hours instead of physical distance in kilometers is used in order to capture the quality of the road. Both in the household and enterprise surveys of the RICS, respondents were asked if they think that corruption, uncertain economic policy and restrictive laws and regulations are problems for establishing and expanding a business. They were also asked similar questions about the criminality, theft and lawlessness of their community. Based on this information, we construct a government dummy that has a value of one if respondents replied that government related issues mentioned above impose problems and zero otherwise. Another dummy for safety is also constructed that has a value of one if safety is a concern in a community and zero otherwise.

As a measure of exogenous factors that can affect agricultural income (φ_t), we construct an index that captures the food security status of a household due to various exogenous shocks. In the household survey of the RICS, households were asked whether they have experienced food shortage due to various exogenous shocks like drought, flooding, price variability, and illness and death of a household member. The questions were asked for each household for four consecutive years from 2003 until 2006. Based on this, we construct an index of food shortage for the year 2003[4]. The index ranges from zero to three, zero being no food shortage and three being the highest level of food shortage.

As an additional control variable, a rural town dummy is used in both probit models in order to capture all kinds of externalities that towns may provide. Dummies for the different manufacturing activities are also included in the exit regression to indicate for possible sectoral variations.

[3] The 2002/03 survey data are used for calculating clustering in order to make the correlation inferable with the dependent variables that are also measured for the past four years of the time of the survey.

[4] Food security status of a household in 2003 is used in order to make the correlation inferable with the dependent variables that are also measured for the past four years of the time of the survey.

4.2 Impact of entry and exit into and from non-farm enterprises on the household's well-being

In order to capture the effect of entry and exit into and from non-farm enterprises on household's well-being, we compare average well-beings between households that have entered and exited non-farm enterprises with counterfactual groups of households that have not entered and have not exited non-farm enterprises respectively. Well-being of a household is measured using three different indicators. The first one is total household income which is the sum of agricultural and non-agricultural income. The second measure of well-being, food security status of the household, is measured as an index by using the same technique as described in the previous section except that now the index is constructed for the year 2006. The third measure is the ability of a household to raise enough money in case of emergency, which is captured by a dummy that has a value of one if a household responded as being able to raise 100 birr in the case of emergency and zero, otherwise.

Since the decision to participate into a non-farm enterprise is not a random process, simply comparing well-being among households may result in selection bias. That is, households with certain socio-economic characteristics might self-select themselves to either enter or exit a non-farm enterprise. These socio-economic characteristics in turn can affect the well-being of households making it difficult to infer a causal relationship. To take into account the bias that may arise from self-selection, we use a non-parametric statistical method known as propensity score matching (PSM), that would allow us to match households that share the same pre-treatment socio-economic characteristics with the exception of either or not entering and exiting a non-farm enterprise (Heckman et al., 1997).

5. Empirical Results

5.1 Determinants of entry and exit of households into and from non-far enterprises

The marginal effects of the probit regression for the entry decision model are presented in Table 1, column I and II. Almost all household characteristics included in the model, except for the immigration status of a household, play a role in the entry decision. Households with young and more educated heads are more likely to start a non-farm enterprise. Female headed households are also more likely to start a non-farm enterprise. High female participation into non-farm enterprises may imply the lack of alternatives for women in other domains, especially agriculture, while men often can exploit profitable market opportunities between complementary activities of non-farm works and agriculture (Loening and Mikael, 2009).

With regard to labor endowment, households with a large number of household members are more likely to start a non-farm enterprise, which may indicate the existence of 'surplus' labor that can easily be shifted from one activity to the other. In order to see which age cohort of household members is more important for the entry decision, we formulate four different age groups as indicated in column II of Table 1. Accordingly, it is found that households having more members in the age cohort of 6 to 15 years old are more likely to start a non-farm enterprise. This may imply the importance of child labor in the entry decision where either children may directly work in non-farm enterprises or engage in agricultural and other house works, the latter allowing other household members to have more time to be allocated to non-farm enterprises.

[Table 1 here]

Households whose roofs are made from iron sheets are more likely to start a non-farm enterprise. This may indicate that relatively wealthy households are more likely to have enough capital for investing in non-farm enterprises either from their own savings or they may also have enough collateral to borrow money from formal sources. Households with a large share of income from agriculture have a lower probability of starting a non-farm enterprise. On the other hand, households with a large share of income from non-agricultural sources like government transfers, off-farm wage employment, remittances, etc. have a high probability of starting a non-farm enterprise. These two results may imply that while households with limited alternatives for an additional income source may become more risk averse to open non-farm enterprises, those with alternative income sources, on the other hand, can better smooth-out the uncertainty regarding agricultural performance, giving them more incentives to invest in non-farm enterprises.

As expected, the concentration of micro enterprises engaged in manufacturing activities in the same district increases the probability of starting a non-farm enterprise. The concentration of big manufacturing firms in the same zone also increases the probability of starting a non-farm enterprise. It is interesting to see that, the concentration of micro enterprises increases the probability of entry by almost double than the concentration of big firms. This may indicate that multiple specialization and external economies of scale arising from clustering of micro enterprises are more important for households' entry decisions implying the existence of markets and possible cooperation between enterprises engaged in a similar line of production.

Among the various indicators of the investment climate, we find a significant effect for access to a road where the further away households are located from the all-weather road; the lower is the probability of starting a non-farm enterprise. This indicates the importance of an improved transportation system for market integration and it is in line with the finding that households located outside of rural towns are also less likely to start a non-farm enterprise. The availability of micro finance institutions (MFIs) in nearby locations has no significant effect on the entry decision of households. This may be because the importance of MFIs has been substituted by the existence of industrial clusters, which through specialization and division of labor can reduce the required capital to start a business, enabling households to use their capital endowment for investment being credit constrained (Ali et al., 2010). In a similar study in rural Ethiopia, Ali and Peerlings (2010) also find that micro enterprises are more likely to cluster further away from MFIs, possibly due to the substitutive role played by industrial clusters in easing the financial constraints of entrepreneurs.

Marginal effects of the probit regression for the exit decision model are reported in Table 1 of column III and IV. Although female headed households are more likely to open a non-farm enterprise as indicated in the entry decision model, they are more likely to exit their business. Studies show that the lack of alternatives for many female entrepreneurs in rural parts of Africa often result in them being engaged in less profitable activities that require little training and skills (Loening and Mikael, 2009), which may have resulted in high exit rates.

Other household characteristics, both in terms of demographic factors and endowments[5], do not play a significant role on the exit decision. Enterprise specific factors, on the other hand, are rather important where we find that large enterprises and those operating in their homes are less likely to exit. Similar evidences on enterprise size and location of operation are also found for micro enterprises operating in other African countries of Swaziland and Zimbabwe (McPherson, 1995).

Enterprises operating in districts where there is clustering of other micro enterprises that produce similar and closely related goods have a lower probability of exit than those operating in isolation. This implies the advantage of clustering in terms of reduced transaction costs and information flows that make enterprises more profitable than their dispersed counterparts. Ali and Peerlings (2010) show for Ethiopia that micro enterprises operating in clusters are more profitable than those operating in isolation. In addition, the trust and close social networks that develop in clusters between traders and input suppliers can help operators of non-farm enterprises to have easy access to working capital, giving them incentives to invest more.

Contrary to the effects of clustering, non-farm enterprises operating in areas where there is a concentration of large firms are found to have a high probability of exit. This may be due to high competition from big firms, especially if they are producing for the same market. In column IV of Table 1, we interact the variables, the concentration of micro enterprises and the concentration of large firms, in order to see the exit decision of clustered micro enterprises that operate closer to concentrated large firms. As can be seen from the results, non-farm enterprises operating in areas where there is a concentration of large firms still have a high probability of exit. However, the interaction term shows that clustering lowers the probability of exit by slightly more than half. This implies that even if large firms can be a threat to small enterprises, non-farm enterprises can still survive if they are operating in clusters. One mechanism how non-farm enterprises operating in clusters can survive and even benefit from the concentration of large firms is through contractual relationships. If non-farm enterprises are operating in clusters, it becomes easier for large firms to give out bulk orders and also monitor the production process and give them on job trainings. Such trade linkages may result in input sharing and information spillovers in terms of design, market opportunities and outputs, which in turn can help non-farm enterprises to tackle the problem of market access by developing their production capabilities and hence upgrading their products.

Non-farm enterprises operating in rural towns have a low probability of exit, implying the importance of market linkages for the survival of micro enterprises.

With respect to the different indicators of the investment climate, lack of safety in a community poses a serious threat for the survival of non-farm enterprises. Using World Bank data, Eifert and Ramachandram, (2004) show that 12.30 % of small firms in Ethiopia identify crime, theft and disorder as a major constraint for their business which is bigger than the 7.61% of large firms. Although we lack further evidence about the real causes of conflict, criminality, theft and lawlessness in rural Amhara; the results of this study indicate that safety could be one of the biggest bottlenecks in the region's, if not necessarily the country's, investment climate.

5.2 Impact of entry and exit into and from non-farm enterprises on household's well-being

[5] Household size is not included in the exit regression because it is highly correlated with the size of the enterprise, which is measured by number of workers.

In this section, we present the results of the propensity score matching on the effect of entry and exit into and from non-farm enterprises on the household's well-being. There are different matching methods to calculate the average treatment effects in the evaluation literature. The one used in this study is a kernel matching method, which associates the outcome of the treated household with the matched outcome that is given by the kernel-weighted average of all the non-treated households. Since the weighted average of all the non-treated households is used to construct the counterfactual outcome, kernel matching has an advantage of lower variance because more information is used (Heckman et al., 1997).

Households that have started a non-farm enterprises show a significant increase in all the measures of well-being. Households that have started a non-farm enterprise have on average 2,784.79 birr (317.17$)[6] more annual income than those who have not opened a non-farm enterprises. Similarly, opening a non-farm enterprise results in a significant reduction of food shortage and an increase in households' ability to raise enough money in case of emergency.

[Table 2 here]

A similar analysis for exit in Table 2show that households that have exited their non-farm enterprise have on average 981.62 birr (111.80$) less annual household income than those who have not exited their business. With regard to other measures of well-being, however, we do not find a significant result although the signs suggest that households that have exited non-farm enterprise businesses may on average experience a higher food shortage and inability to raise enough money in case of emergency. The reason why we did not see a significant effect for these well-being measures may be because the exit dummy is constructed only for those households that have closed their business in the past four years of the time of the survey. Hence, while the direct income effect of exiting a business can immediately be seen, it might take a little bit more time for the indirect effects, such as those on food security, to materialize.

The results of the matching quality are reported in Table 3. Column I and II show the results of the chi-square test for the joint significance of covariates used in the probit model before and after the match (Sianesi , 2004). The chi square test after the match for the entry decision model confirms that all the covariates in the probit model are not jointly significant with prob>$\chi 2$ = 0.29 for the matches performed on total household income. Similar results are obtained for the matches performed on food shortage and the ability of a household to raise money in case of emergency with prob>$\chi 2$ = 0.35. Another measure used to confirm the quality of the match is the mean bias reduction after the match (Rosenbaum and Rubin, 1985). As reported in column IV, the mean absolute bias for the covariates after the match in the probit model of the entry decision lies below the 20% level of bias suggested by Rosenbaum and Rubin (1985). For the exit decision model, the chi-square tests after the match in Column II indicate that the covariates of the probit model are not jointly significant with prob>$\chi 2$ = 0.99 for all the three measures of household's well-being. The mean absolute bias reduction of covariates after the match is also well below 20%. The matching quality tests for the entry and exit models suggest that the matching procedures have performed well in terms of avoiding systematic difference in the distribution of pre-treatment observable covariates included in the PSM between treated and non-treated groups.

[Table 3 here]

6. Discussion and Conclusions

This paper examines how clustering determines the entry and exit decisions of households into and from a non-farm enterprise in rural Ethiopia. It is found that the existence of clusters of micro enterprises in the same district increases the likelihood of households to start a non-farm enterprise. This implies the importance of industrial clusters in helping reduce the entry barriers by lowering the required start up investment due to specialization and division of labor. Transaction costs for establishing a business could also be lower in industrial clusters because needed assets, skills, inputs and local markets are readily available (Porter, 2000; Delgado et al., 2010). Non-farm enterprises operating in clusters are found to have a lower probability of exit than those operating outside of clusters. This indicates that industrial clusters are also important for the survival and growth of enterprises by making them more profitable than their dispersed counterparts through reduced transaction costs and information flows. In addition, the trust and close social networks that develop in clusters between traders and input suppliers might help operators of non-farm enterprises to have easy access to working capital, giving them incentives to invest more. It is also found that, although the concentration of large firms in nearby areas increases the probability of exit, non-farm enterprises are more likely to survive around large firms if they are operating in clusters. One mechanism how non-farm enterprises operating in clusters can survive and even benefit from concentration of large firms is through contractual relationships, which could help non-farm enterprise to tackle the problem of market access by developing production capabilities and hence upgrade their products.

[6] The average exchange rate for the year 2006 was 1 $ = 8.78 Birr.

The study further investigates the impact of entry and exit into and from non-farm enterprises on household's well-being by using total household income, the food security status of a household and its ability to raise enough money in case of an emergency, as indicators. Using propensity score matching to account for selection bias, it is found that, entry into non-farm enterprises significantly increases households' well-being by all the three measures. Exit from non-farm enterprises, on the other hand, is found to significantly reduce households' income. With regard to other measures of well-being, however, we do not find a significant result. These results of the PSM are also found to be robust for different matching algorithms used.

The findings of this study indicate that the growing interest of policy makers to promote non-farm enterprises in rural areas of Africa should take into account the importance of industrial clusters that could help to reduce the various transaction costs that entrepreneurs may face both when establishing and expanding their businesses. While the constraints faced by rural non-farm enterprises are heterogeneous, lack of market integration remains to be the most important one (Loening and Mikael, 2009). The results of this study show that clustering could be one way where market integrations can be enhanced by helping increase competition and smoothing out market failures such as in credit markets. Policies seeking to address poverty in Africa should also consider the potential contributions of rural non-farm enterprises in helping to improve households' well-being. Although the return from non-farm enterprises are generally lower, especially compared to high-return activities such as wage labor, they can still play an important role in ensuring rural livelihood.

A follow-up question that can be raised from the results of the PSM is that why, given their similar characteristics with that of the counterfactuals, some households choose not to start a non-farm enterprise or exit the already established ones even if that decision would have a positive effect on their well-being. One possible explanation for this is due to some unobservable characteristics of households that can affect their entry and exit decisions. Such unobservable characteristics may include factors such as pride and preferences of households to work in the agricultural sector that may arise due to family tradition to farming life. Also cultural taboos may restrict exit and entry decisions, for example women that are not allowed to engage in certain activities. One caveat of this study is therefore its inability to capture these and other related unobservable characteristics of households in the matching procedure. Another caveat of this study is its reliance on cross-sectional data that restricts the possibility of looking at the dynamic impact of clustering on start-up businesses. Despite these shortcomings, however, the results of this study show the role of clusters as one way of enhancing rural development by fostering entrepreneurship.

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Table 1: Marginal effects of probit regression for the probability of entry into and exit from a non-farm enterprise.

	$prob(entry)$		$prob(exit)$	
	I	**II**	**III**	**IV**
Household Characteristics				
Male (d)	-0.10***	-0.09***	-0.03**	-0.03**
	(0.02)	(0.02)	(0.01)	(0.01)
Age	-0.00***	-0.00***	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Schooling	0.01***	0.01***	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Immigrant (d)	-0.00	-0.01	-0.00	0.00
	(0.01)	(0.01)	(0.02)	(0.02)
Household labor and capital endowment				
Household size	0.01***			
	(0.00)			
Household size age≤5		0.01		
		(0.01)		
Household size 6≤age≤ 15		0.01***		
		(0.005)		
Household size 15<age≤65		0.00		
		(0.01)		
Household size age> 65		0.02		
		(0.02)		
Roof iron sheet (d)	0.04***	0.04***	-0.01	0.00
	(0.01)	(0.01)	(0.02)	(0.02)
Share of agricultural income	-0.03*	-0.03*	-0.00	-0.01
	(0.02)	(0.02)	(0.04)	(0.04)
Share of non-agricultural income	0.07***	0.07***	-0.03	-0.04
	(0.02)	(0.02)	(0.06)	(0.05)
Enterprise specific factors				
Size of the enterprise (number of worker)			-0.06***	-0.05**
			(0.02)	(0.02)
Year since establishment			-0.00	-0.00
			(0.00)	(0.00)
Cottage industry (d)			-0.26**	-0.23**
			(0.11)	(0.10)
Activity seasonal (d)			0.01	0.01
			(0.02)	(0.02)
Concentration				
Concentration of micro enterprises in the same district	0.18**	0.19**	-0.02*	0.00
	(0.08)	(0.08)	(0.01)	(0.01)
Concentration of big manufacturing firms in the same zone	0.09***	0.09**	0.06*	0.16***
	(0.02)	(0.02)	(0.03)	(0.06)
Concentration of micro enterprises in the same district X				-0.09**
Concentration of big manufacturing firms in the same zone				(0.04)
Investment Climate				
Government (d)	0.02	0.02	0.02	0.02
	(0.04)	(0.04)	(0.06)	(0.07)
Safety (d)	0.01	0.02	0.48*	0.53**
	(0.04)	(0.04)	(0.28)	(0.28)
Distance to nearest all-weather road (hours)	-0.02***	-0.02***	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Distance to nearest MFI's (hours)	-0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Exogenous Shocks				
Food shortage due to exogenous shocks four years ago	-0.02	-0.02	0.01	0.00
	(0.01)	(0.01)	(0.03)	(0.03)
Others				
Rural Town (d)	0.09***	0.09***	-0.06**	-0.06**
	(0.03)	(0.03)	(0.03)	(0.03)
No of observation	2433	2433	353	353
Pseudo R2	0.211	0.212	0.258	0.278

Note: Robust standard errors are reported in parenthesis. (d) is for discrete change of dummy variable from 0 to 1; * p<0.10, ** p<0.05, *** p<0.01. For the exit regression, sectoral dummies for different production activities are included in the regression but are not reported here because none of them are significant.

Table 2: Treatment Effects

Treatment	Outcome indicators	ATT	Treated		Control	
			On support	Off support	On support	Off support
Entry	Total household income[a]	2784.79*** (597.99)	295	1	2137	-
	Food shortage	-0.09** (0.04)	294	2	2137	-
	Able to raise money in case of emergency	0.05* (0.03)	294	2	2137	-
Exit	Total household income[a]	-981.62** (520.74)	29	2	322	-
	Food shortage	0.18 (0.18)	29	2	322	-
	Able to raise money in case of emergency	-0.15 (0.12)	29	2	322	-

Note: the standard errors are reported in parenthesis and are computed after bootstrapping 50 times.
[a] Other household income is not used in the generation of the propensity scores since they are now part of the outcome variable: total household income.

Table 3: Indicators of matching quality before and after the match

		I	**II**	**III**	**IV**	**V**
Treatment	Outcome indicators	p-value[a] (unmatched)	p-value[a] (matched)	Mean[b] absolute bias (unmatched)	Mean[b] absolute bias (matched)	Absolute bias reduction
Entry	Total household income	0.00	0.29	42.69	7.52	83.02
	Food shortage	0.00	0.43	46.90	7.80	83.37
	Able to raise money in case of emergency	0.00	0.43	46.90	7.80	83.37
Exit	Total household income	0.00	0.99	27.12	13.66	49.63
	Food shortage	0.00	0.99	25.93	13.47	47.01
	Able to raise money in case of emergency	0.00	0.99	25.93	13.47	47.01

[a] *p*-value of likelihood ration test ($Pr > \chi^2$)
[b] absolute bias (in percentage) is calculated as the difference of sample mean of outcome variable of the treated and non-treated groups times the square root of the average of the sample variance of outcome variable of the treated and non-treated groups (Rosenbaum and Rubin, 1985).